FAXONIUS LIMOSUS (RAFINESQUE, 1817) AS AN ALTERNATIVE SOURCE OF CHITIN AND CHITOSAN

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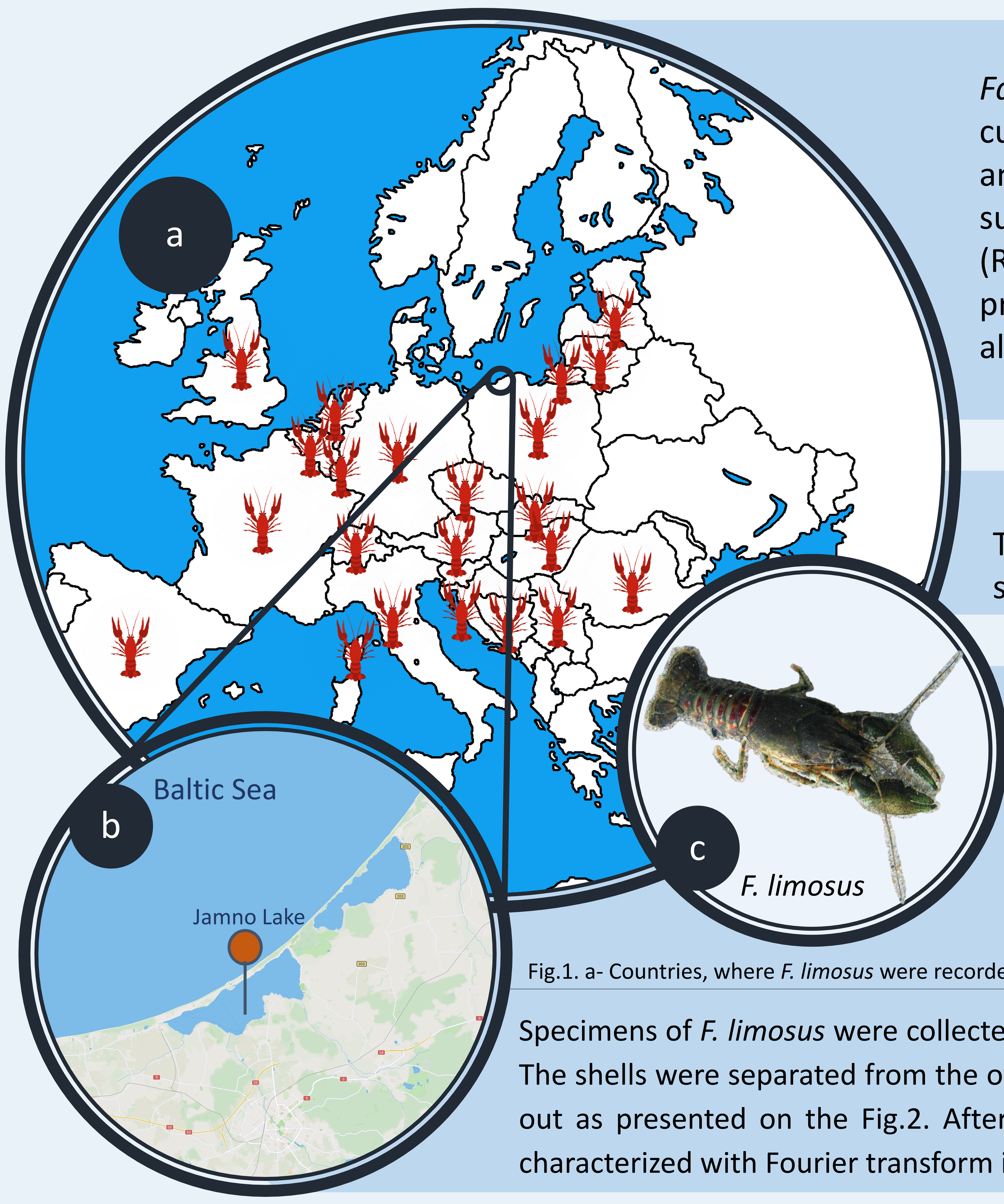
INTRODUCTION

Faxonius limosus (Rafinesque, 1817) was introduced from North America to Europe in 1890 for cultivation and consumption. It spread in the fresh and brackish waters around the Europe (Fig.1.) and is currently considered one of the most invasive crayfish species there (CABI, 2021). It has been suggested, that harvesting invasive species might help the native species rebuild their populations (Robertson et al., 2020). However, once the specimens are taken out of the environment, another problem arises - what to do next? The idea is to put this waste into a circular economy. There are already studies proving that *F. limosus* meat is a valuable nutrient (Śmietana et al., 2021).

THE AIM

The aim of this study was to investigate whether the *F. limosus* shells might be an alternative source of chitin.

MATERIAL AND METHODS



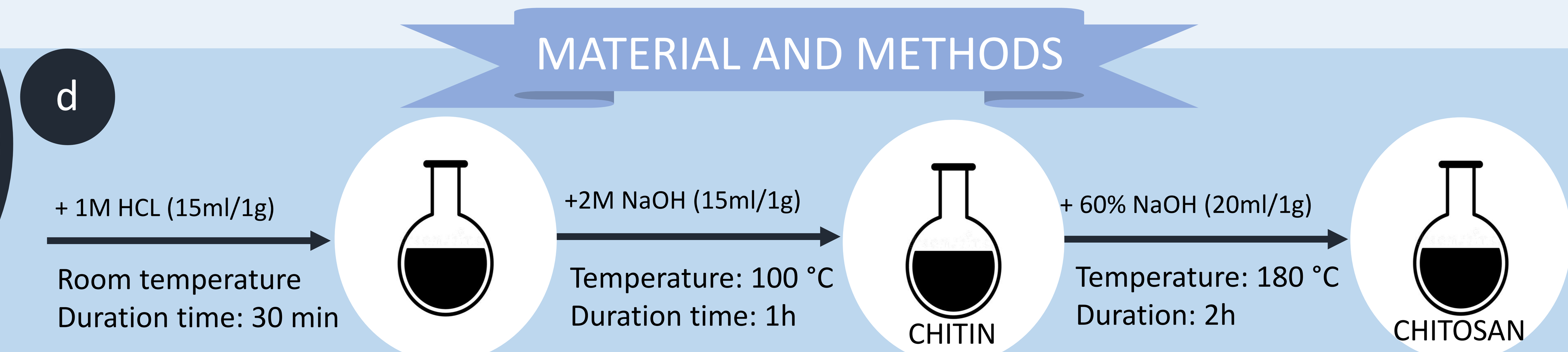
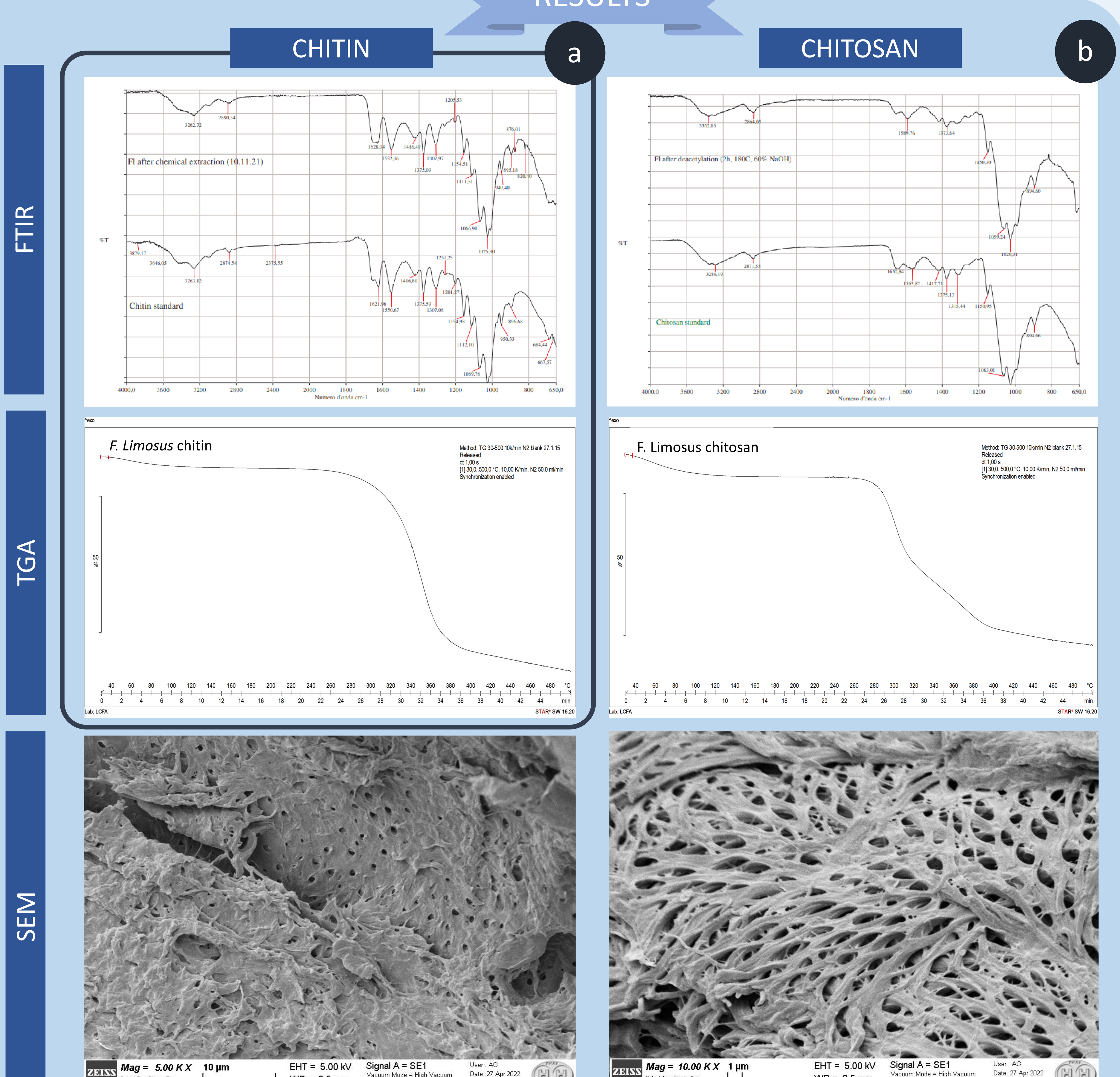


Fig.1. a- Countries, where *F. limosus* were recorded (Kouba et al., 2014), b- sample collection site, c- *F. limosus* (Joanna Jaszczołt), d- method used for material extraction and deacetylation.

Specimens of *F. limosus* were collected from Jamno lake during summer and autumn 2015. They were cooked for 8 h, and dried at 50°C for 24h. The shells were separated from the other tissues, and ground to powder. The demineralization deproteinization, and deacetylation were carried out as presented on the Fig.2. After every step, the material was washed with distilled water to neutral pH. The obtained polymers were characterized with Fourier transform infrared spectroscopy (FTIR) and thermogravimetric analysis (TGA).

RESULTS



Flg.2 a- FTIR and TGA analysis of te obtained chitin, b- FTIR, TGA and SEM (Alessandro Girella) analysis of the obtained chitosan

DISCUSSION

Our study shows that *F. limosus* shell wastes might be a source of α-chitin, and it is possible to obtain a chitosan from it. Both polymers have similar quality to the standards (Fig.2.a, b). The SEM analysis showed, that obtained chitosan have porous, fiber-like structure (Fig.2.b) which indicate the potential use in pharmaceuticals (Ishihara et al., 2015). The yield of chitin and chitosan constituted respectively about 20±1,7 % and 14±3 % (mean ± standard deviation of triplicate determinations) of the dry carapax weight which is less than from *Astacus leptodactylus* (Küçükgülmez; 2018) or from crayfish waste (Ghannam et al., 2016). However, according to Abdou et al. (2008) the content of chitin in crayfish shells that warrants its industrial production with a relatively low cost is about 20-21 %. Therefore the wastes resulting from harvesting *F. limosus* from the environment might be entered into a circular economy, and not contribute to the waste that is already a major problem worldwide.

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